

**WHAT IS CLAIMED IS:**

1. A method for allocating radio resources in a radio communication system comprising the steps of:

selecting a service quality requirement for a first service group and a  
5 second service group;

determining an amount of radio resources for the first and second service groups to achieve the respective service quality requirement; and

allocating the radio resources between the first and second service groups based on a difference between the determined amount of radio resources, wherein  
10 the radio resources are allocated per bearer within the first and second service groups.

2. The method of claim 1, wherein the determined amount of radio resources is a relative amount of radio resources between the first and second service groups.

15 3. The method of claim 1, wherein the determined amount of radio resources is an absolute amount of radio resources for the first and second service groups.

4. The method of claim 1, wherein said service quality is a function of user quality, within the service group.

5. The method of claim 4, further comprising the step of:  
compensating the amount of radio resources for the first and second service  
5 groups based upon a percentage of users of the first and second service groups  
which is desired to achieve the quality of service requirement,  
wherein the radio resources are allocated based upon the compensated  
amount of radio resource.

6. The method of claim 4, wherein the quality of service requirements  
10 is measured or estimated by carrier-to-interference ratios, bit error probability, bit  
error rate, frame erasure rate or block error rate.

7. The method of claim 5, wherein the compensation is based on the  
carrier-to-interference ratio standard deviation.

8. The method of claim 1, wherein the amount of radio resources is  
15 based on a power level used for the first and second service groups and the

difference between the determined amount of radio resources is a difference in power between the first and second service groups.

5 9. The method of claim 8, wherein the difference in power between the first and second service groups is applied to a fixed output power of the first service group.

10. The method of claim 8, wherein the difference in power between the first and second service groups is applied to a maximum power for the first service group.

10 11. The method of claim 8, wherein the difference in power between the first and second service groups is applied to an initial power for the first service group.

12. The method of claim 8, wherein the difference in power between the first and second service groups is applied to a fixed power, a maximum power and an initial power for the first service group.

13. The method of claim 8, further comprising the step of:  
adjusting the power for individual users of a service group using individual  
power control loops.

14. The method of claim 8, wherein the amount of radio resource is  
further based on the number of channels allocated to the first and second service  
group.

15. The method of claim 8, wherein the amount of radio resource is  
further based on the scheduling to the first and second service group such that the  
amount of channel used by each service group is controlled by the scheduling.

16. The method of claim 8, wherein the step of allocating the radio  
resources further comprises the steps of:

calculating a sum of the total power for all users in the radio  
communication system; and

admitting new users to the radio communication system if the sum is less  
than a predetermined threshold.

17. The method of claim 16, further comprising the step of:  
dropping users from the radio communication system if the sum is greater than  
another predetermined threshold, wherein the radio communication system  
includes at least two base stations.

5 18. The method of claim 8, wherein the step of allocating the radio  
resources further comprises the steps of:

calculating a function of the power for all users in the radio communication  
system; and

admitting new users to the radio communication system if the calculated  
10 function is less than a predetermined threshold.

19. The method of claim 18, further comprising the step of:  
dropping users from the radio communication system if the calculated function is  
greater than another predetermined threshold, wherein the radio communication  
system includes at least two base stations.

20. The method of claim 8, wherein the step of allocating the radio resources further comprises the steps of:

calculating a weighted sum of the power for all users in the radio communication system; and

5 admitting new users to the radio communication system if the weighted sum is less than a predetermined threshold.

21. The method of claim 20, further comprising the step of:  
dropping users from the radio communication system if the weighted sum is  
greater than another predetermined threshold, wherein the radio communication  
10 system includes at least two base stations.

22. The method of claim 8, wherein the radio communication system includes a base station, the step of allocating radio resources further comprises the steps of:

calculating a sum of the total power for all users communicating with the  
15 base station;

admitting new users to the base station if the sum is less than a predetermined threshold; and

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dropping users from the base station if the sum is greater than the predetermined threshold.

23. The method of claim 16, wherein the radiocommunication system is a GSM/EDGE radio access network (GERAN).

24. The method of claim 1, wherein the selecting step and the determining step are continuously performed to provide an updated allocation of radio resources.

25. The method of claim 5, wherein the percentage of users of the first and second service groups who can achieve the quality of service requirement is measured and the amount of radio resources is adaptively compensated for based upon the updated percentage of users of the first and second service groups.

26. The method of claim 1, wherein the selecting, determining and allocating steps are performed for the first service group, the second service group and a third service group.

27. A method for allocating radio resources in a radio communication system comprising the steps of:

selecting a service quality requirement for a first service group and a second service group;

5 determining an amount of radio resources for the first and second service groups to achieve the respective service quality requirement;

allocating the radio resources between the first and second service groups based on a difference between the determined amount of radio resources, wherein the radio resources is an amount of power;

10 calculating the total amount of radio resources employed by the first and second service groups; and

allocating radio resources to a new user to the radio communication system if the total amount of radio resources is less than a predetermined threshold.

28. The method of claim 27 further comprising the step of:

15 deallocating radio resources from a user in the first or second service group if the total amount of radio resources is greater than the predetermined threshold.

29. The method of claim 27, wherein the radio communication system is a GSM/EDGE access network (GERAN).



30. A method of allocating radio resources for a first and second service group comprising the steps of:

determining an amount of radio resources at which the first service group can provide an minimum quality of service level;

5 determining an amount of radio resources allocated for the second service group; and

reallocating radio resources proportionally from the second service group to the first service group such that the service quality limits are simultaneously met.

10 31. The method of claim 30, wherein the radio resources are reallocated to maximize capacity.

32. The method of claim 30, further comprising the steps of:

determining an amount of radio resources at which a third service group can provide an minimum quality of service level;

15 determining an amount of radio resources allocated for a third service group; and

reallocating radio resources from the fourth service group to the third service group such that the total load between the first, second, third and fourth service groups is maximized.

5 33. The method of claim 30, wherein the radio resources are an output power for the first and second service groups.

34. The method of claim 33, wherein the radio resources are further a channel allocation for the first and second service groups.

10 35. The method of claim 33, wherein the output power for the first and second service groups is a per bearer output power for the first and second service groups.

36. The method of claim 33, wherein the output power is an initial power for the service group.

37. The method of claim 33, wherein the output power is a maximum power for the service group.

38. The method of claim 33, wherein the output power is a fixed power for the service group.

39. A method for allocating radio resources comprising the steps of:  
allocating a first transmit power per bearer for a first service group; and  
allocating a second transmit power per bearer for a second service group.

40. The method of claim 39, wherein the first and second transmit powers are allocated to a maximum or an initial output power per bearer for the first and second service groups.

41. The method of claim 39, wherein the first and second transmit powers are allocated based upon a measurement of bearer quality.

42. The method of claim 39, further comprising the step of:  
estimating a link quality, wherein the first and second transmit powers are allocated based upon the estimate.

43. The method of claim 39, wherein the first and second transmit powers are allocated to balance a quality of service between the first and second service groups.

44. The method of claim 39, wherein the first and second transmit powers are allocated based upon a desired fraction of satisfied users for each of the first and second service groups.

45. The method of claim 39, wherein the first and second transmit powers are repeatedly updated based upon estimates of quality for the first and second service groups.

46. The method of claim 39, wherein the first and second transmit powers are repeatedly updated based upon measurements of quality for the first and second service groups.

47. A radio communication system comprising:  
means for selecting a service quality requirement for a first service group  
and a second service group;

means for determining an amount of radio resources for the first and second service groups to achieve the respective service quality requirement; and

means for allocating the radio resources between the first and second service groups based on a difference between the determined amount of radio resources, wherein the radio resources are allocated per bearer within the first and second service groups.

48. The system of claim 47, wherein the determined amount of radio resources is a relative amount of radio resources between the first and second service groups.

49. The system of claim 47, wherein the determined amount of radio resources is an absolute amount of radio resources for the first and second service groups.

50. The system of claim 47, wherein said service quality is a function of user quality, within the service group.

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10            53.     The system of claim 51, wherein the compensation is based on the  
carrier-to-interference ratio standard deviation.

54. The system of claim 50, wherein the amount of radio resources is based on a power level used for the first and second service groups and the difference between the determined amount of radio resources is a difference in power between the first and second service groups.

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58. The system of claim 54, wherein the difference in power between the first and second service groups is applied to a fixed power, a maximum power and an initial power for the first service group.

59. The system of claim 54, further comprising:  
means for adjusting the power for individual users of a service group using  
15 individual power control loops.

60. The system of claim 54, wherein the amount of radio resource is further based on the number of channels allocated to the first and second service group.

61. The system of claim 54, wherein the amount of radio resource is further based on the scheduling to the first and second service group such that the amount of channel used by each service group is controlled by the scheduling.

62. The system of claim 50, wherein the system provides an updated allocation of radio resources using the means for selecting and means for determining.

63. The system of claim 51, wherein the percentage of users of the first and second service groups who can achieve the quality of service requirement is measured and the amount of radio resources is adaptively compensated for based upon the updated percentage of users of the first and second service groups.

64. The system of claim 50, wherein the means for selecting, determining and allocating operate in connection with the first service group, the second service group and a third service group.



65. A radio communication system for allocating radio resources for a first and second service group comprising:

means for determining an amount of radio resources at which the first service group can provide an minimum quality of service level;

means for determining an amount of radio resources allocated for the second service group; and

means for reallocating radio resources proportionally from the second service group to the first service group such that the service quality limits are simultaneously met.

66. The system of claim 65, wherein the radio resources are reallocated to maximize capacity.

67. The system of claim 65, further comprising:

means for determining an amount of radio resources at which a third service group can provide an minimum quality of service level;

means for determining an amount of radio resources allocated for a third service group; and

means for reallocating radio resources from the fourth service group to the third service group such that the total load between the first, second, third and fourth service groups is maximized.

68. The system of claim 65, wherein the radio resources are an output  
5 power for the first and second service groups.

69. The system of claim 68, wherein the radio resources are further a channel allocation for the first and second service groups.

70. The system of claim 68, wherein the output power for the first and second service groups is a per bearer output power for the first and second service  
10 groups.

71. The system of claim 68, wherein the output power is an initial power for the service group.

72. The system of claim 68, wherein the output power is a maximum power for the service group.

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73. The system of claim 68, wherein the output power is a fixed power for the service group.

74. A radio communication system for allocating radio resources comprising:

5 means for allocating a first transmit power per bearer for a first service group;

means for allocating a second transmit power per bearer for a second service group.

75. The system of claim 74, wherein the first and second transmit  
10 powers are allocated to a maximum or an initial output power per bearer for the first and second service groups.

76. The system of claim 74, wherein the first and second transmit powers are allocated based upon a measurement of bearer quality.

77. The system of claim 74, further comprising:  
15 means for estimating a link quality, wherein the first and second transmit powers are allocated based upon the estimate.

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78. The system of claim 74, wherein the first and second transmit powers are allocated to balance a quality of service between the first and second service groups.

79. The system of claim 74, wherein the first and second transmit powers are allocated based upon a desired fraction of satisfied users for each of the first and second service groups.

80. The system of claim 74, wherein the first and second transmit powers are repeatedly updated based upon estimates of quality for the first and second service groups.

81. The system of claim 74, wherein the first and second transmit powers are repeatedly updated based upon measurements of quality for the first and second service groups.